It has long been known that rocks suffer actual molecular movement if the forces act so slowly that they do not overpass the elastic limit of the rock, and again bodily movement must take place if the rock is subject to stresses greater than the ultimate strength of the rock, but the knowledge of the fact that solid matter has so much in common with gases and liquids is almost wholly due to the laborious investigations of Professor Spring, and these facts should immediately take their place in our theories of the condition of matter in the interior of the earth. C. F. TOLMAN, JR.

United States Geologic Atlas, Folio 37. Downieville, California. 1897.

This folio consists of eight pages of text signed by H. W. Turner, geologist, a topographic map of the district, a map showing the areal geology, a map showing the economic features, a structure section sheet, and one page of special illustrations.

The quadrangle represented in this folio lies between parallels 39° 30′ and 40° north latitude, and 121° and 120° 30′ west longitude. It comprises a portion of the northern Sierra Nevada and lies in Plumas and Sierra counties. The area is drained by the forks of the Feather and Yuba rivers.

The formations are divided into two main groups, the bed-rock series and the superjacent series. The bed-rock series is composed of Juratrias and Palæozoic sediments and tuffs, and a series of old igneous rocks chiefly granites and porphyries. The Juratrias rocks comprise chiefly the Milton formation which is found only in the southeast portion of the quadrangle. The Milton formation, while formed of materials deposited under water, contains a large amount of igneous material. Underlying the Milton formation there are volcanic beds which are likewise presumed to be of Juratrias age, inasmuch as in the lower portion there are lenses of siliceous argillite, in one of which an ammonite was found. These volcanic beds are grouped as quartz-porphyry and as augite-porphyrite. The quartz-porphyry also occurs as dikes. The other igneous rocks forming part of the bed-rock series are granite, gabbro, and granodiorite. In the western portion of the quadrangle there are very large amounts of serpentine which have resulted from the decomposition of the pyroxene olivine rocks or peridotites and amphibolite which is the result of dynamo-metamor-

phism and hydro-metamorphism of augite-porphyrite. The rocks of the auriferous slate series comprise, besides the Milton formation just noted, an older set of rocks probably largely of Carboniferous age, as fossils of that age only have been found in them. These Carboniferous rocks are divided into two formations, the Robinson formation of late Carboniferous or possibly of Permian age, and the Calaveras formation, comprising rocks probably older than the Robinson formation.

The superjacent series consists of river slake deposits, moraines, and volcanic material. All of the rocks of the bed-rock series, both slates and igneous rocks, were greatly eroded during Cretaceous time and upon this old eroded surface there has been deposited by rivers of Tertiary age an extensive series of gravels, known as the auriferous gravel series. The river system of Tertiary time appears to be divisible into two distinct drainage systems with a divide between. This divide is represented by the high ridge of which the Sierra Buttes is the culminating point. The rivers to the west of this high north-south ridge drained southerly or southwesterly in Tertiary time as they do now. The deposits to the east of this Neocene divide appear to have been deposited by one large river which flowed north, draining into a basin to the north of the quadrangle. Superimposed upon these gravels, and at other points upon the older bed-rock surface, are extensive deposits of lavas, mostly in the form of breccias which have been very largely eroded. At one time these lavas probably covered nearly the entire surface of the quadrangle. They consist chiefly of andesites and basalts. The latest basalts, notably the kind forming the larger portion of Mount Ingalls, are possibly of early Pleistocene age. After the volcanic forces had subsided, portions of the region were occupied by glacial ice, resulting in the formation of very extensive moraines, which are finely seen on the east slope of the Sierra Buttes, about Gold Lake, and in the neighborhood of Johnsville. All of the lakes that lie on the east slope of the high ridge extending from the Sierra Buttes to Eureka Peak, are of glacial origin.

There are evidences of faulting in Tertiary and later time at various places in the district. The largest fault zone is that lying immediately west of Mohawk Valley. The faulting along the south and west sides of the American Valley, may perhaps be correlated with the same fault zone. As a result of this faulting the country to the east of the fault zone has subsided, resulting in the formation of the Mohawk and American valleys. Mohawk Valley, during early Pleistocene time,

was occupied by a lake which has left terraces about the valley. These are finely preserved on the slope west of the north end of the valley.

Economic geology.— As economic features there are represented on the map numerous lenses of limestone, which is often highly magnesian. Gold quartz veins are indicated by orange dashes. The auriferous gravels are noted, and also deposits of chrome iron and of magnetite.

Bulletin of the American Museum of Natural History. Vol. IX, 1897.

This volume contains twenty-four separate articles contributed by members of the museum staff. Those from the departments of vertebrate and invertebrate palæontology will be briefly noticed.

Article IV. *Note on the Hypostome of Lichas (Terataspis) grandis* Hall. By R. P. WHITFIELD, pp. 45–46.

Lichas (Terataspis) grandis, is one of the largest and most highly ornamented trilobites of the Devoinan faunas. As yet it has never been found preserved except as fragments, and previous to the present paper no hypostome of the species has been described. This note by Professor Whitfield describes, with illustrations, two large hypostomes supposed by him to belong to this species. They are from loose bowlders of Schoharie grit obtained in northern New Jersey and are associated with other fragments of the same trilobite and with other species of the same horizon.

Article VI. *The Ganodonta and their relationship to the Edentata.* By J. L. WORTMAN, pp. 59–110.

The relationship of the Edentate mammals has long puzzled zoölogists, and previous to the establishment of the suborder *Ganodonta* by Dr. Wortman, no palæontologist has more than suggested what this relationship might be. Although the genera composing the group have long been known, yet the materials, up to the present time, have been so imperfect and fragmentary as to preclude any very exact knowledge of their affinities, and they have been placed by different authors at different times with the *Tillodontia*, the *Tæniodonta*, and the *Creodonta*. By the aid of the discovery of a fore limb of one of the species, *Pisittacotherium multifragum*, in association with the lower jaw and